

Te Wai o Te Taiao Flow Dissipation Theory

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 $i=\sqrt{-1}$*

Extended Abstract

Tom Roa of Te Pūnaha Matatini referred to weaving threads through the eye of a single needle, to create new insights. Te Wai o Te Taiao Flow Dissipation Theory (TWT-FDT) is a woven tapestry of knowledge, science, and ethics where a unifying context is provided by traditional pre-colonial Māori cosmology, a koha from Dr Te Huirangi Eruera Waikerepuru. At present, there is no meta-theory for science in a broad spectrum framework. Since a formal system of signs generates unsolvable propositions following Gödel's Incompleteness theorem, a resolution to finding a meta-theory might reasonably be found in a non-formal system of signs. The proposed interconnective binding is founded in the sequence Te Kore - Te Pō - Te Ao Mārama. TWT-FDT mathematically unites Quantum Theory and Complexity Science through the $\sqrt{-1}$, used in the Schrödinger equation [1], wave functions, probability amplitudes and renormalisation set theory in Quantum Physics [2]; and to map the Julia and Mandelbrot Sets [3], in Hilbert [4] and Fourier transforms [2] in Complexity Science. As Kwong [2] wrote: "It appears that i is *indispensable* in the formulation of quantum mechanics." The Schrödinger equation and Mandelbrot set are non-trivial locations, semantically interconnecting Quantum Theory and Complexity Science.

The proposed binding allows the interconnection of all science in a sequence of discrete, peer reviewed, discipline based mahi, ranging from the Big Bang to four-dimensional spacetime (i.e. Quantum Theory), and from fractals to Midwifery (i.e. Complexity Science) utilising the connective $i=\sqrt{-1}$. Of note to Network Science, the $\sqrt{-1}$ appears in impedance modeling of power grids, communication networks, and signal flow systems. It is required for modeling signal processing and network traffic analysis. Complex-valued neural networks, which incorporate $\sqrt{-1}$, can enhance learning in systems with oscillatory or phase-sensitive data improving adversarial robustness in AI systems [5]. Flow dissipation occurs across a wide range of fluid dynamics (see Figure 1).

In providing a tissue of interconnection for science an unanticipated result is to imbue science with an ethic. It becomes a matter of finding the appropriate science. For example, if it is asked "are the genders equal?" an appropriate response is "according to medical science humans of all genders share 99.9% DNA." If a further question is asked "are humans connected to nonhuman species," the response is "yes, the DNA record demonstrates a sliding scale of DNA from chimpanzees at 96% shared through to mice at 86% and trees at 15% shared." This view coincides with positioning in Indigenous knowledge systems such as knowledge held by Moana peoples. Note that the discussion has moved almost imperceptibly from science to ethical considerations. The structure doesn't supply a singular truth, but rather a discussion around the appropriate science to apply to ethical queries. As we are connected to diverse species and the environment, a stance of resource exploitation is no longer tenable to aware individuals. This provides further guidance and an additional imperative regarding the human relationship to the environment, where it can be demonstrated that historically, releasing facts and data has been insufficient to bring about change.

Notably, TWT-FDT provides a decolonised context for the interaction of knowledge across cultural boundaries in a way that endorses, supports and upholds Indigenous Māori and Moana knowledge. It also allows for science to be conducted outside of a value-laden knowledge system that privileges itself. These contexts are vital to our collective future.

References

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Figure 1. **Still frame from Tangaroa Water Life.** Flow dissipation is prevalent in ocean dynamics. Video by the author.